

Constant Speeding Variable Pitch Propeller System

Propeller Control Unit (PCU) Operation

How the PCU changes propeller pitch and maintains constant engine speeds

Basic Principal of Operation

The Pilot moves the throttle lever which, as well as changing fuel flow and therefore engine power, selects an RPM for the engine to run at.

(You will see later that the throttle is connected to both the Fuel Control Unit and the PCU)

The PCU maintains the selected speed by adjusting propeller pitch.

This eases pilot workload :-

Especially during combat as the engine is automatically prevented from over speeding and therefore potential destruction and the pilot can concentrate on defeating the enemy

And during civilian/transport duties giving the same engine safeguards as above allowing the pilot to concentrate on flying the aircraft, and therefore deliver the passengers and/or cargo safely to their destination

Throttle Positions: -

Take Off

Cruise

Start & Idle

Pilot Input Signal

Hydraulic Return

Hydraulic Pressure Supply

PCU

Engine RPM Signal (Mechanical Drive)

Engine Mounted | Propeller Hub

Sliding Collar

Spring

Counter Balance Weights

Hydraulic Valve

Connecting Linkage

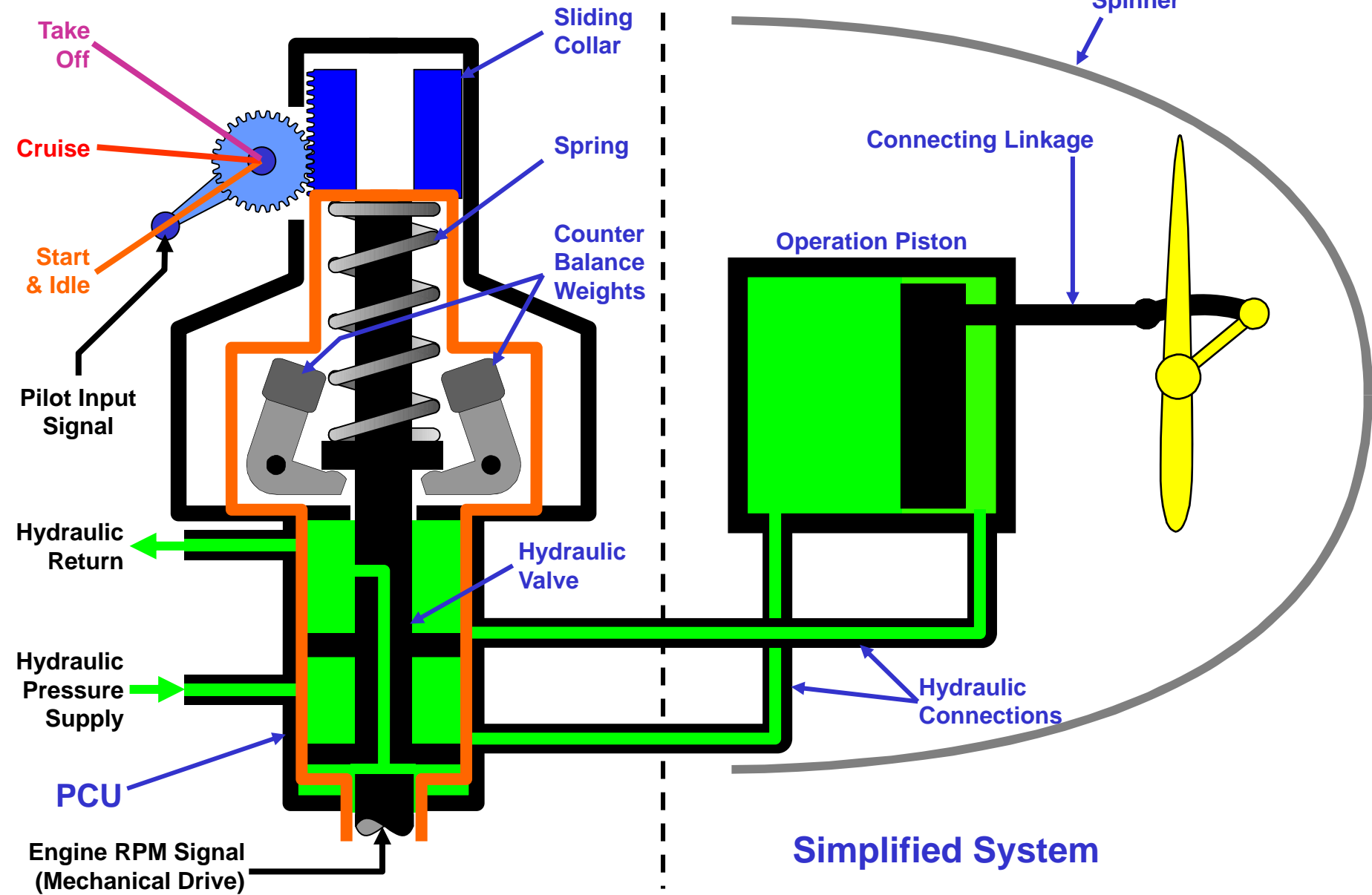
Operation Piston

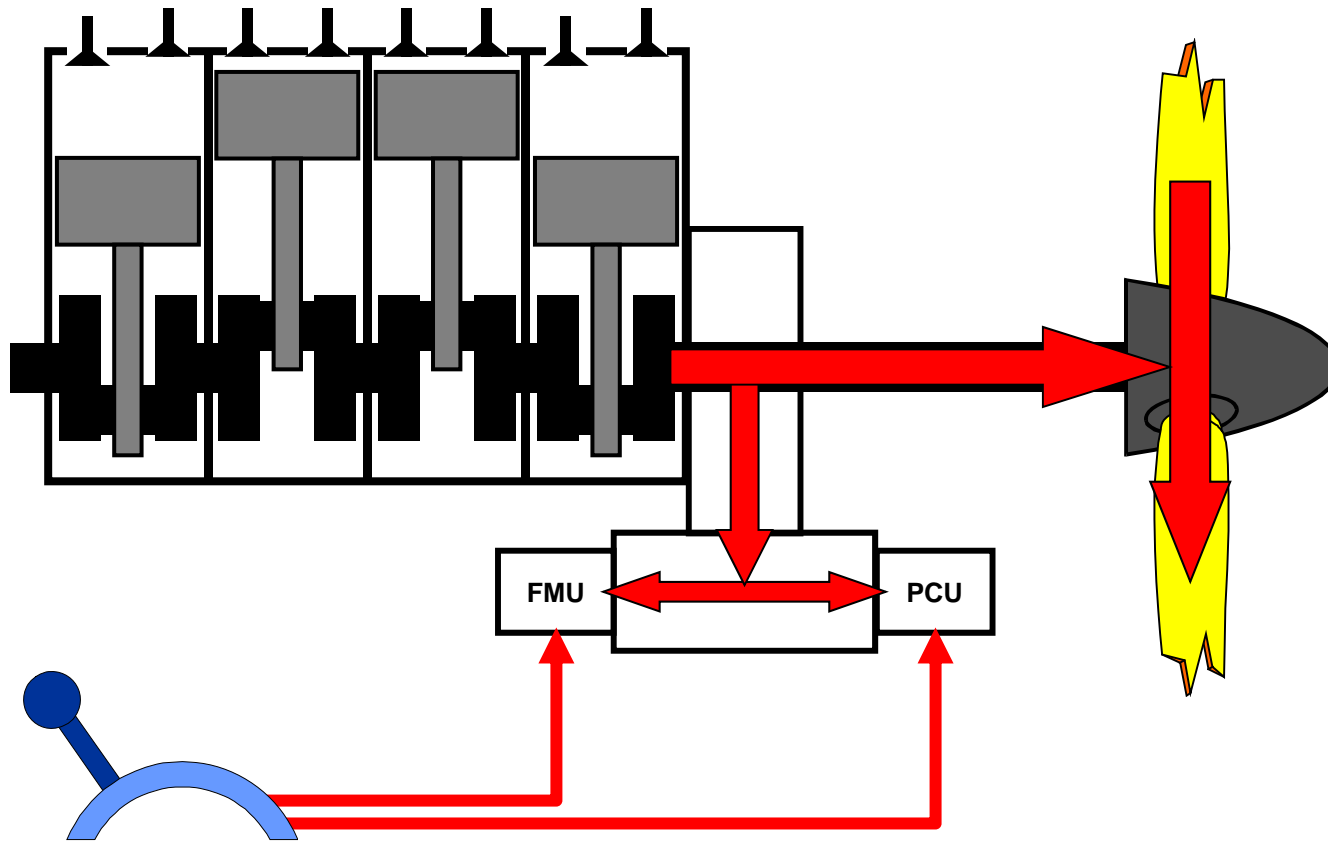
Spinner

Hydraulic Connections

Simplified System

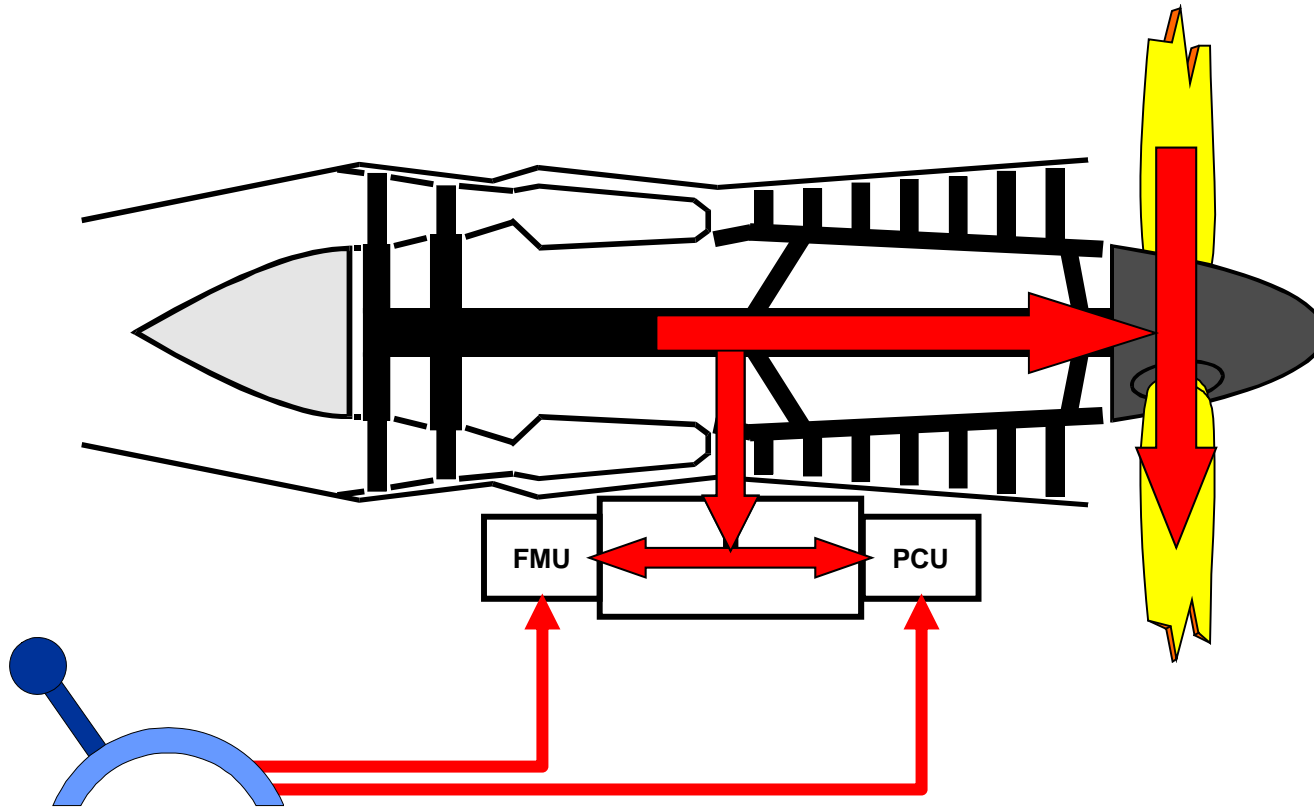
PROPELLER SYSTEM – VARIABLE PITCH CONTROL





Piston Engine driven propeller

PROPELLER SYSTEM – VARIABLE PITCH CONTROL



Jet Engine driven propeller – Turbo-Prop

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

Throttle Positions

Take Off

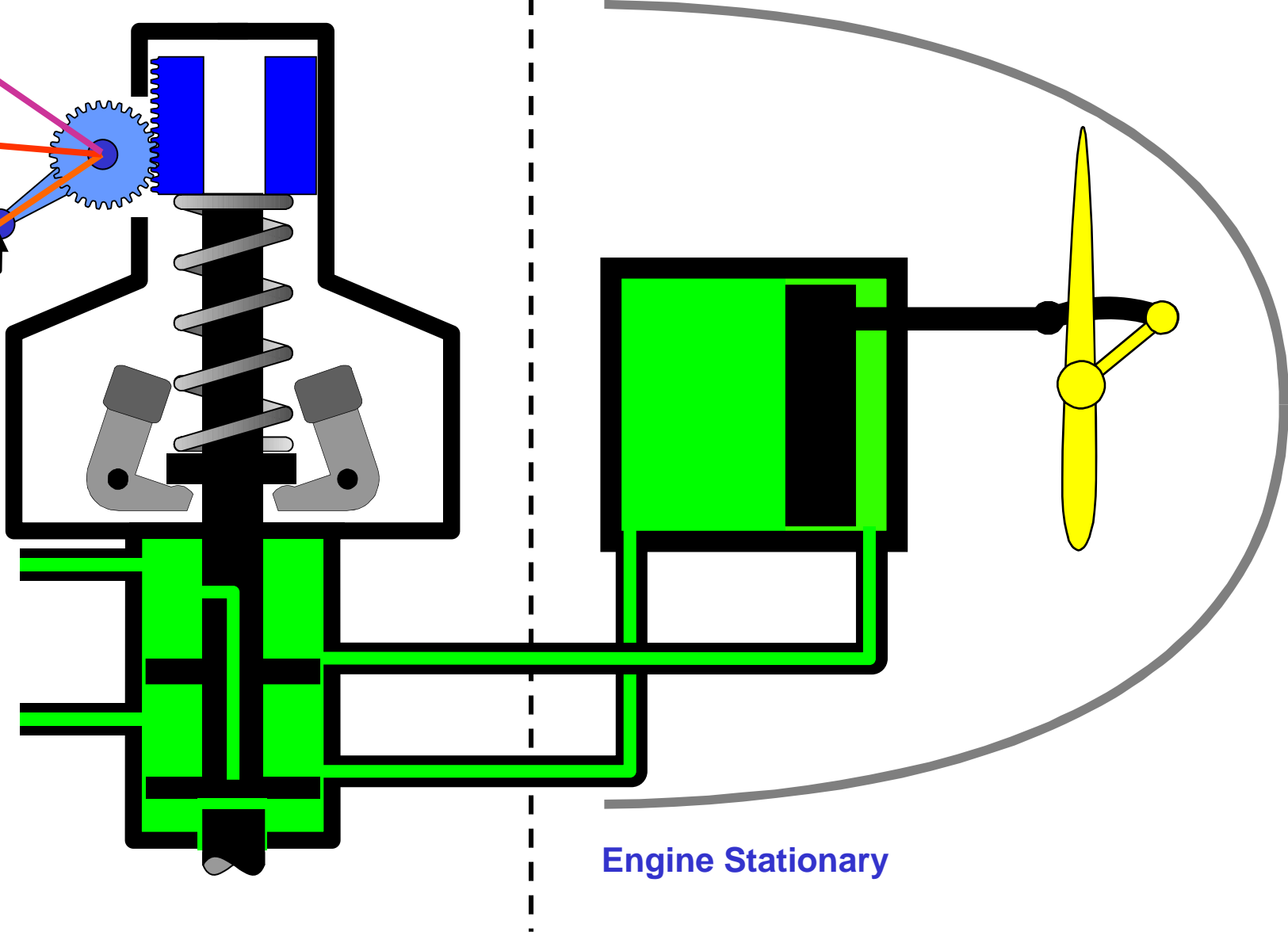
Cruise

Start & Idle

Pilot Input Signal

Engine Mounted

Propeller Hub



Engine Stationary

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

Throttle Positions

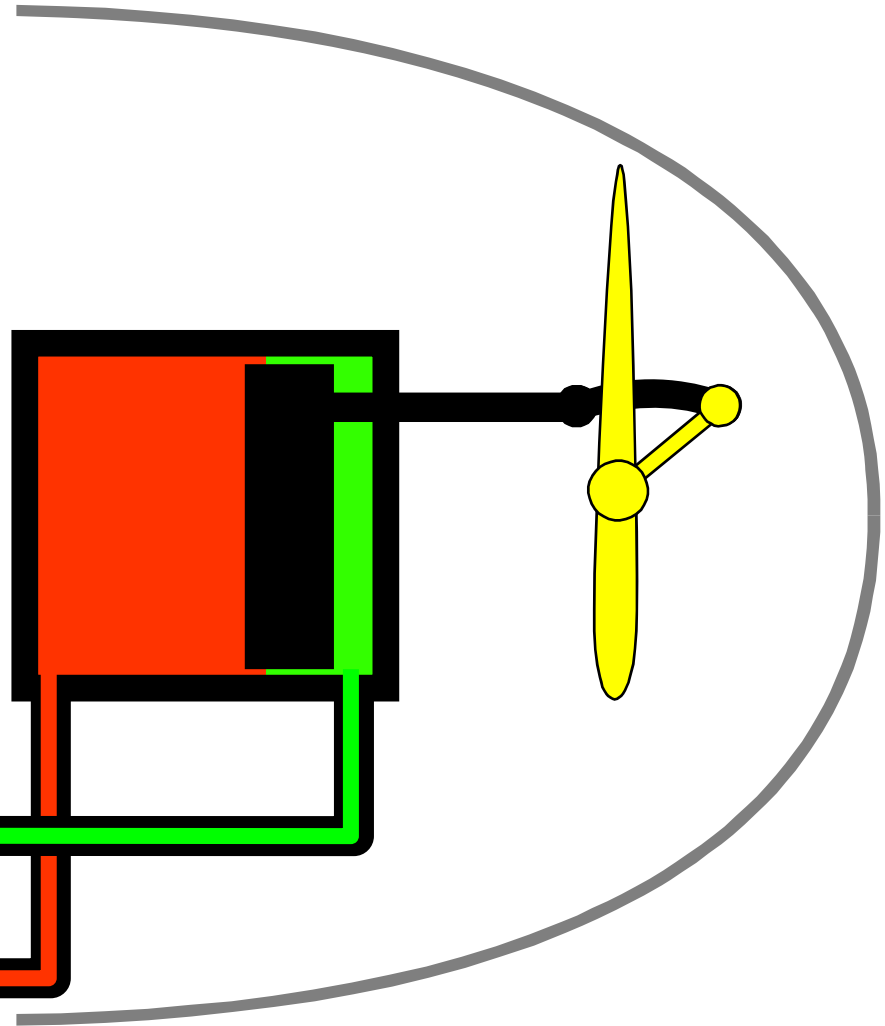
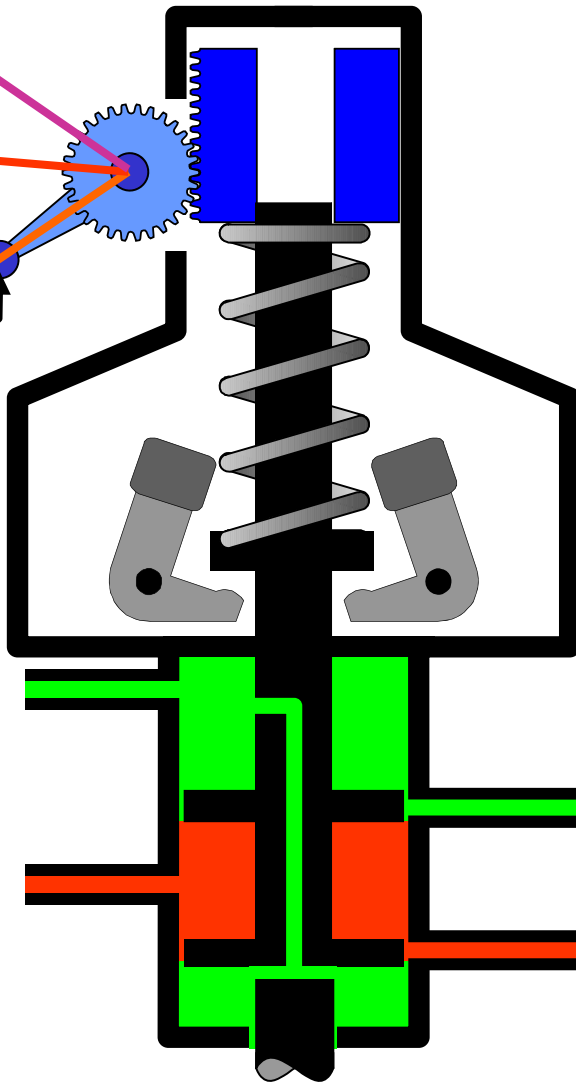
Engine Mounted | Propeller Hub

Take Off

Cruise

Start & Idle

Pilot Input Signal



Start Initiated – Engine Begins to Rotate

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

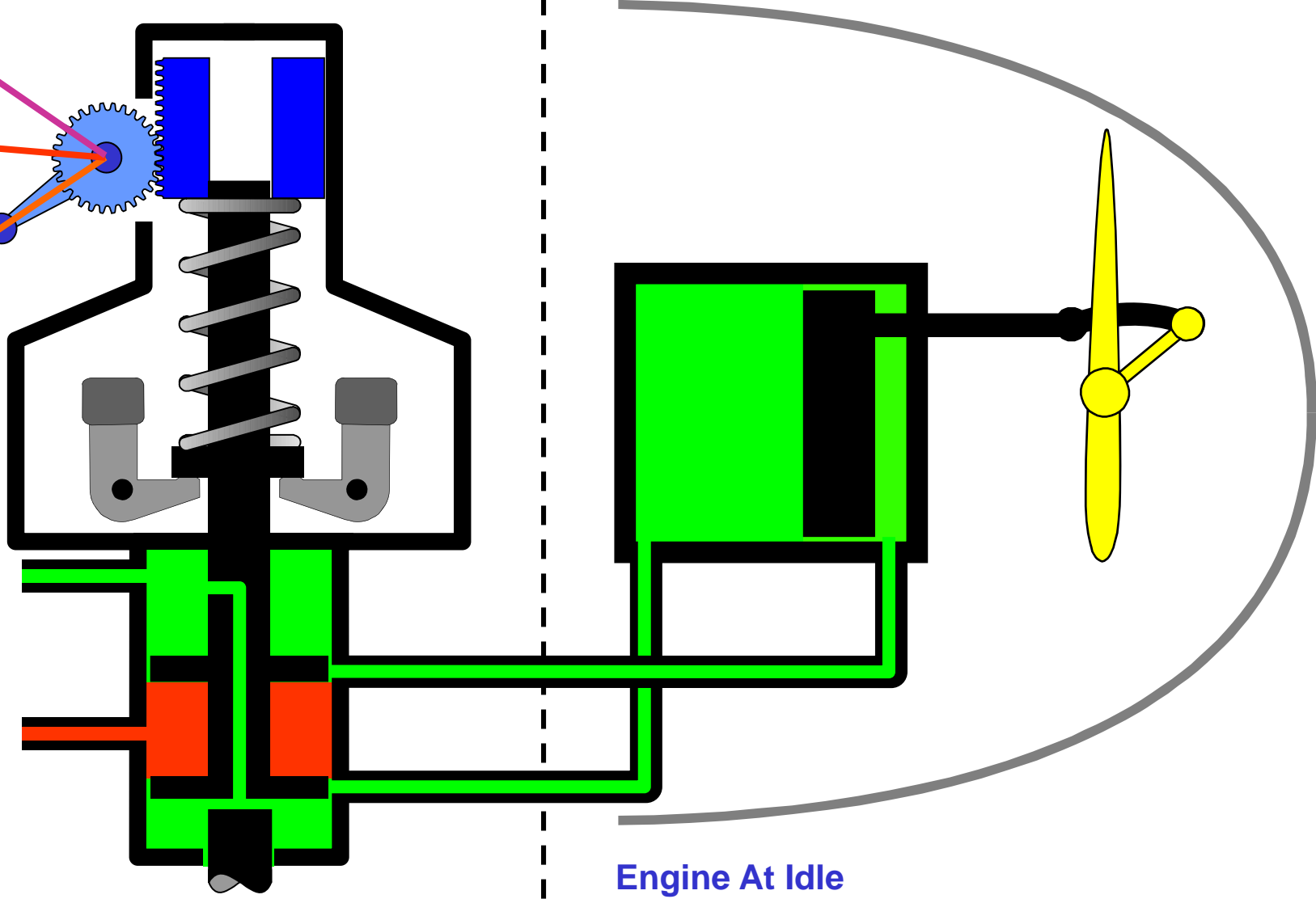
Throttle Positions

Take Off

Cruise

Start & Idle

Engine Mounted | Propeller Hub



Engine At Idle

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

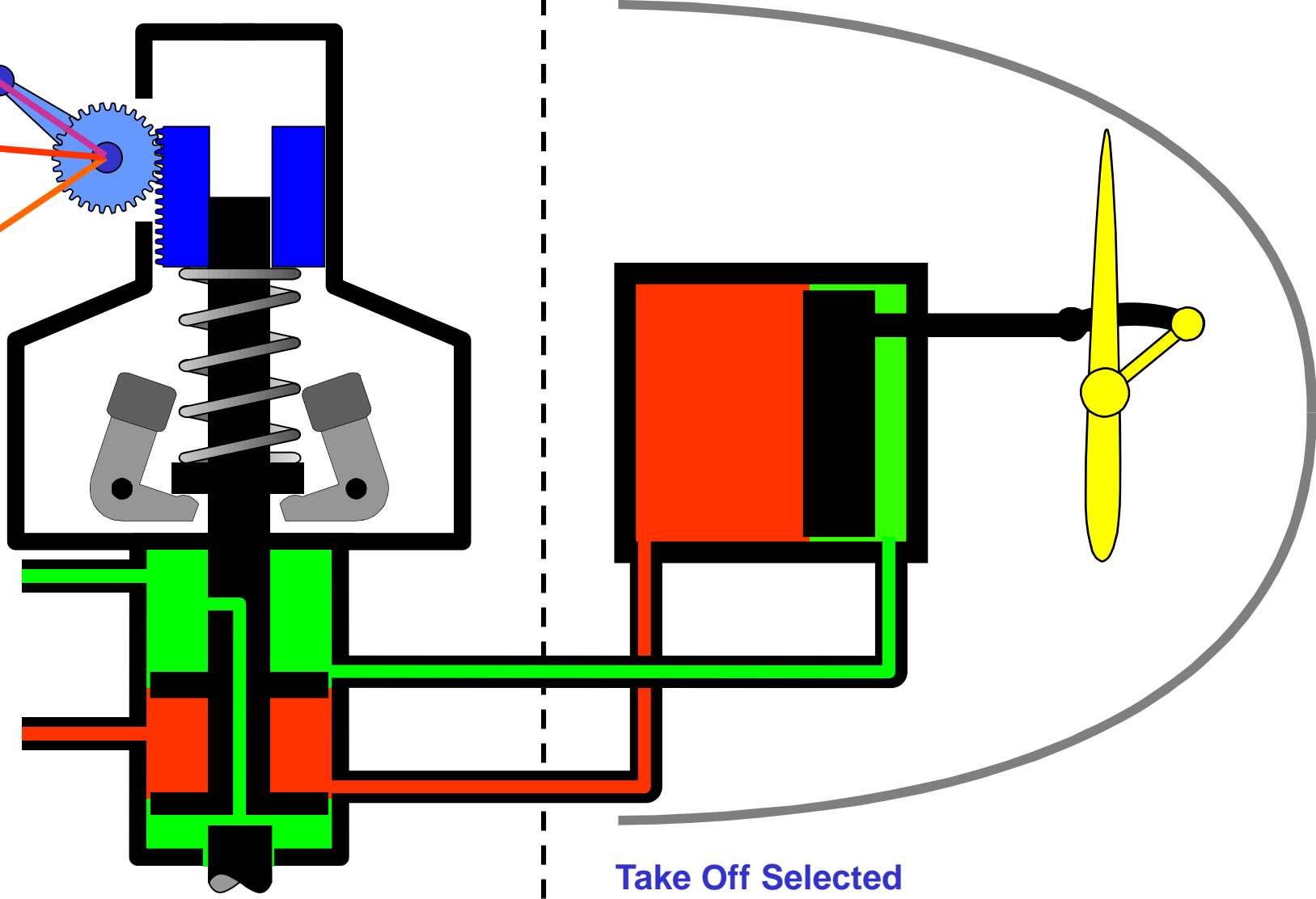
Throttle Positions

Engine Mounted | Propeller Hub

Take Off

Cruise

Start & Idle



PROPELLER SYSTEM – VARIABLE PITCH CONTROL

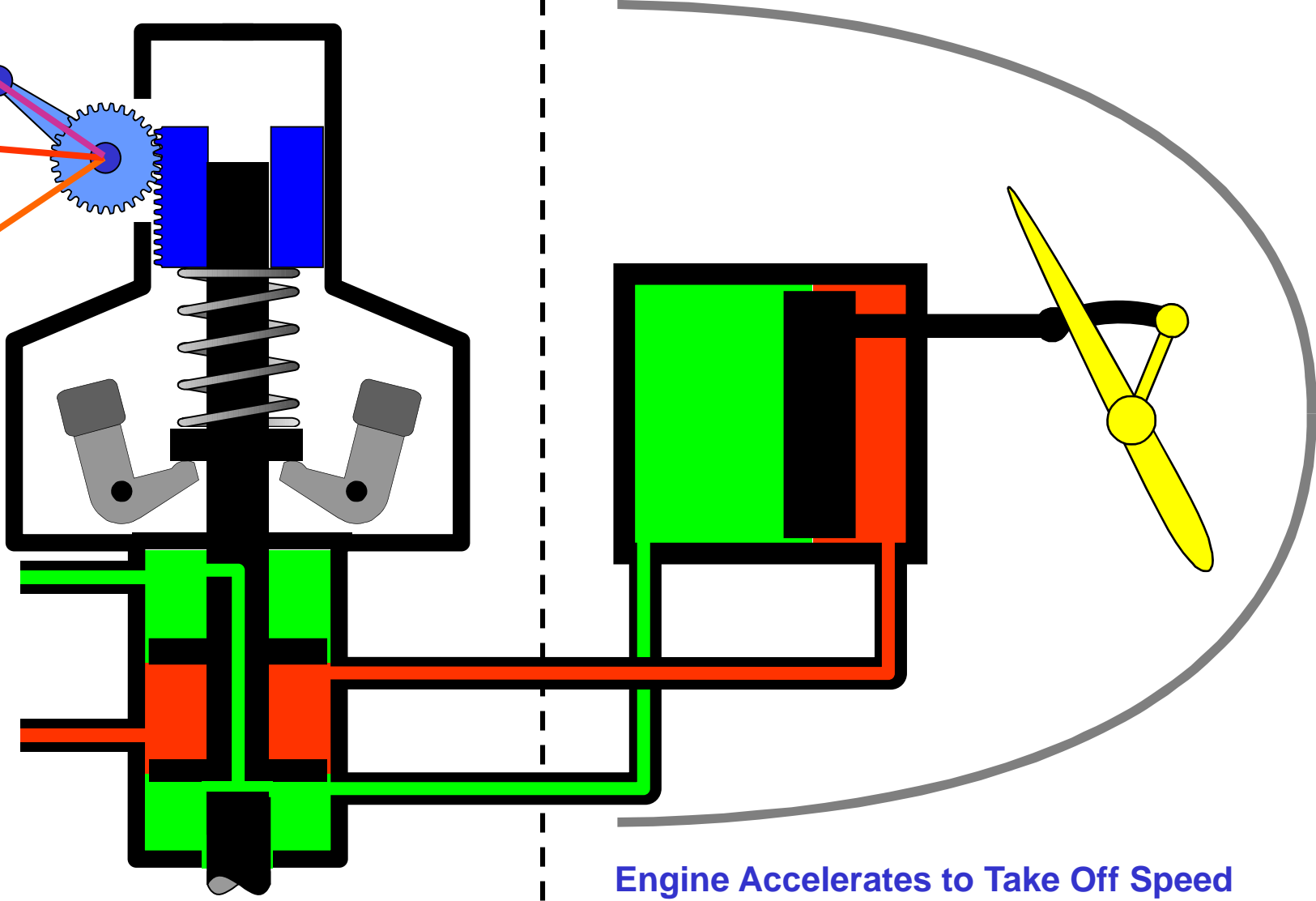
Throttle Positions

Take Off

Cruise

Start & Idle

Engine Mounted | Propeller Hub



Engine Accelerates to Take Off Speed

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

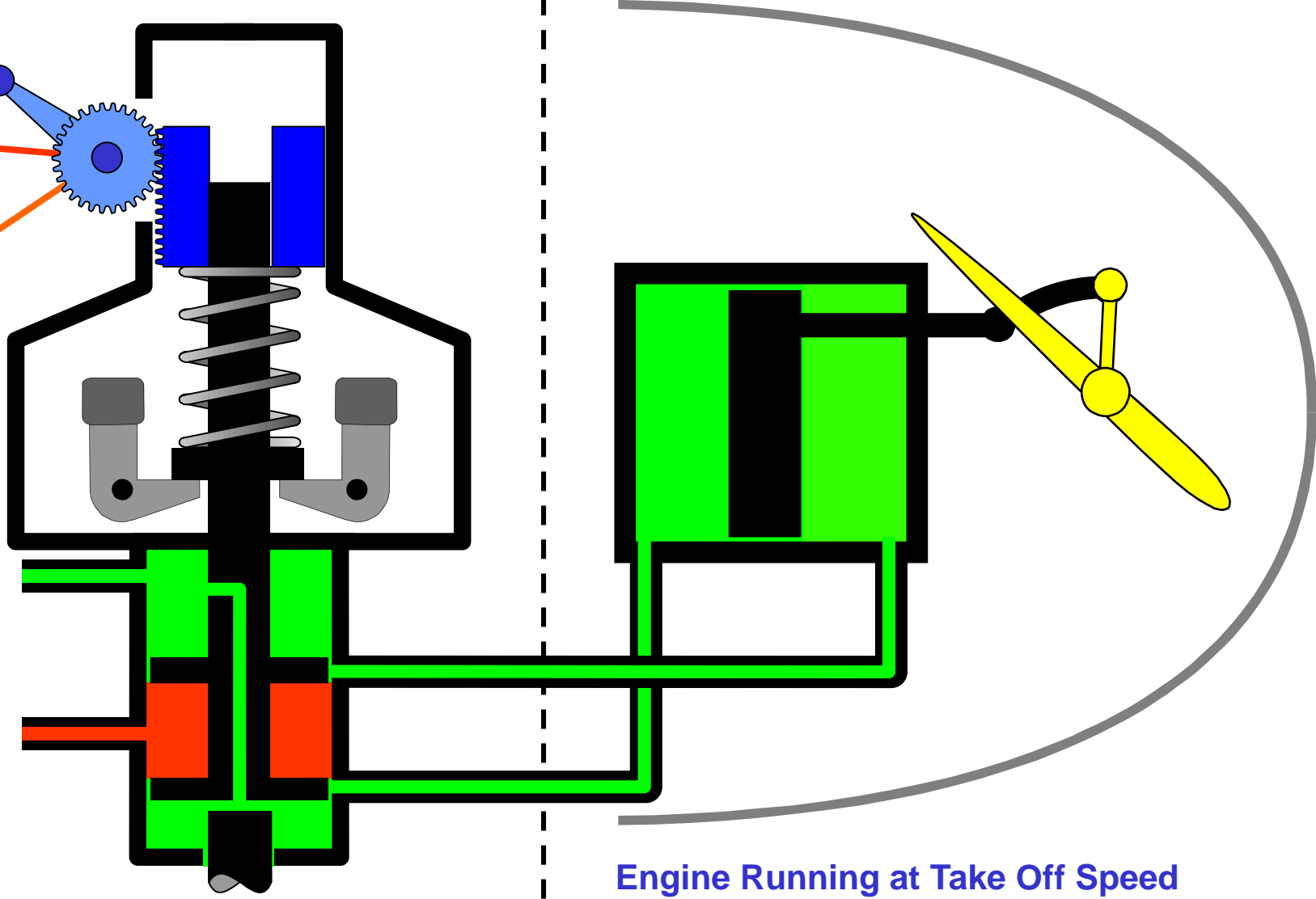
Throttle Positions

Take Off

Cruise

Start & Idle

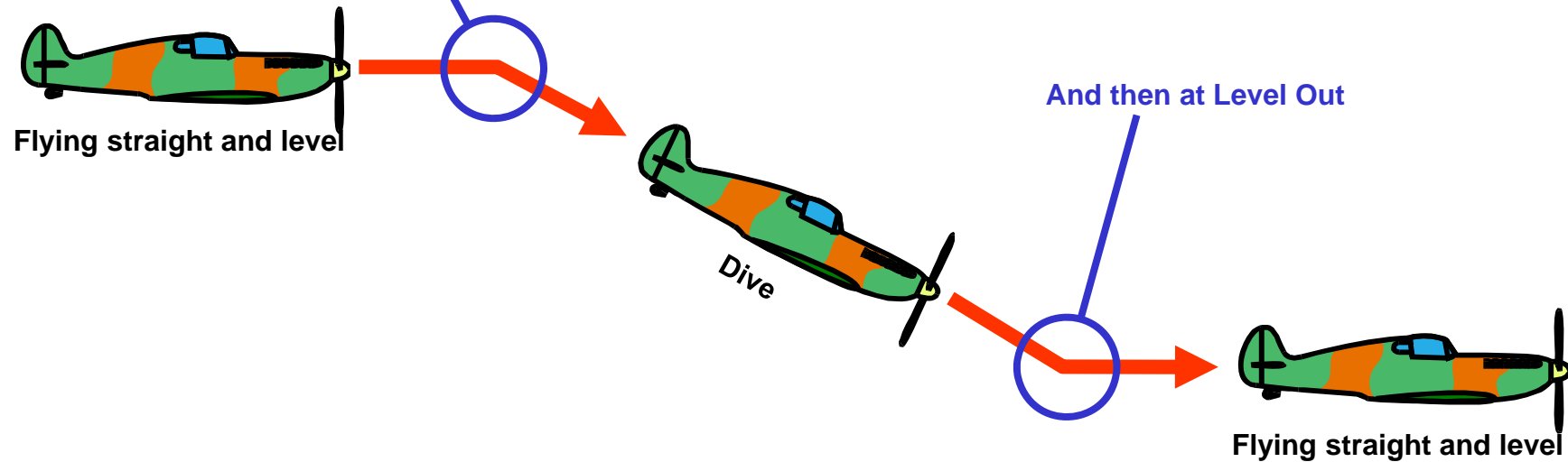
Engine Mounted | Propeller Hub



Engine Running at Take Off Speed

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

Look at how the PCU changes propeller pitch and maintains constant engine speeds during Dive commencement



In all these manoeuvres, all the pilot is doing is flying (redirecting) the aircraft, the throttle is not touched.

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

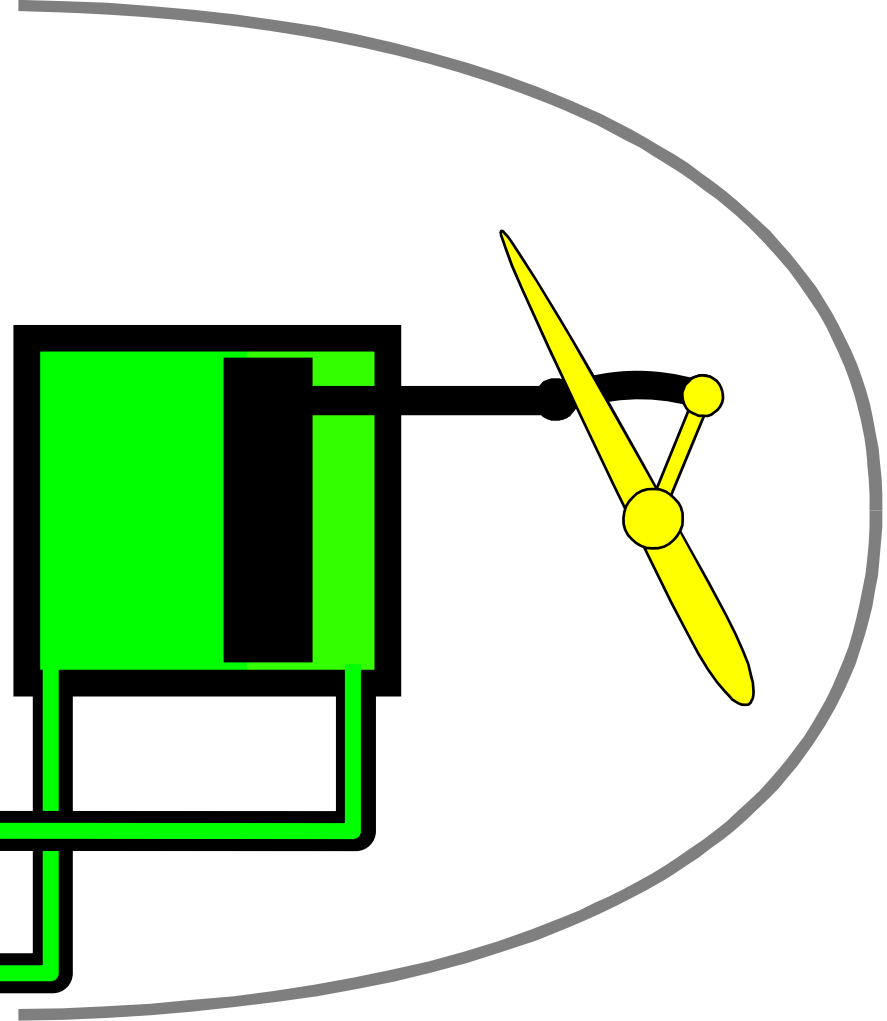
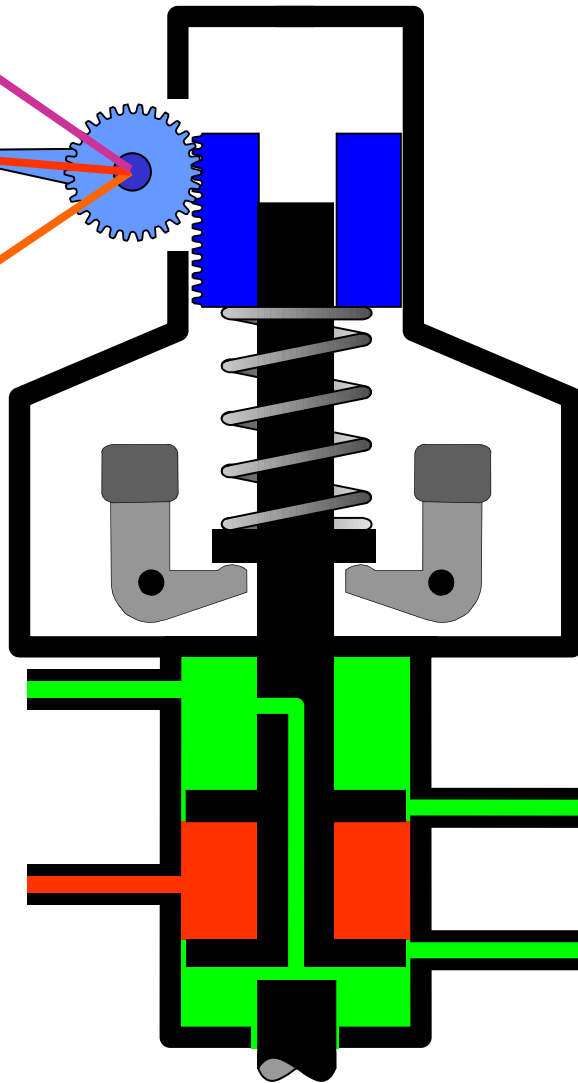
Throttle Positions

Engine Mounted | Propeller Hub

Take Off

Cruise

Start & Idle



Throttle (and Engine) at Cruise – Aircraft Starts Dive

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

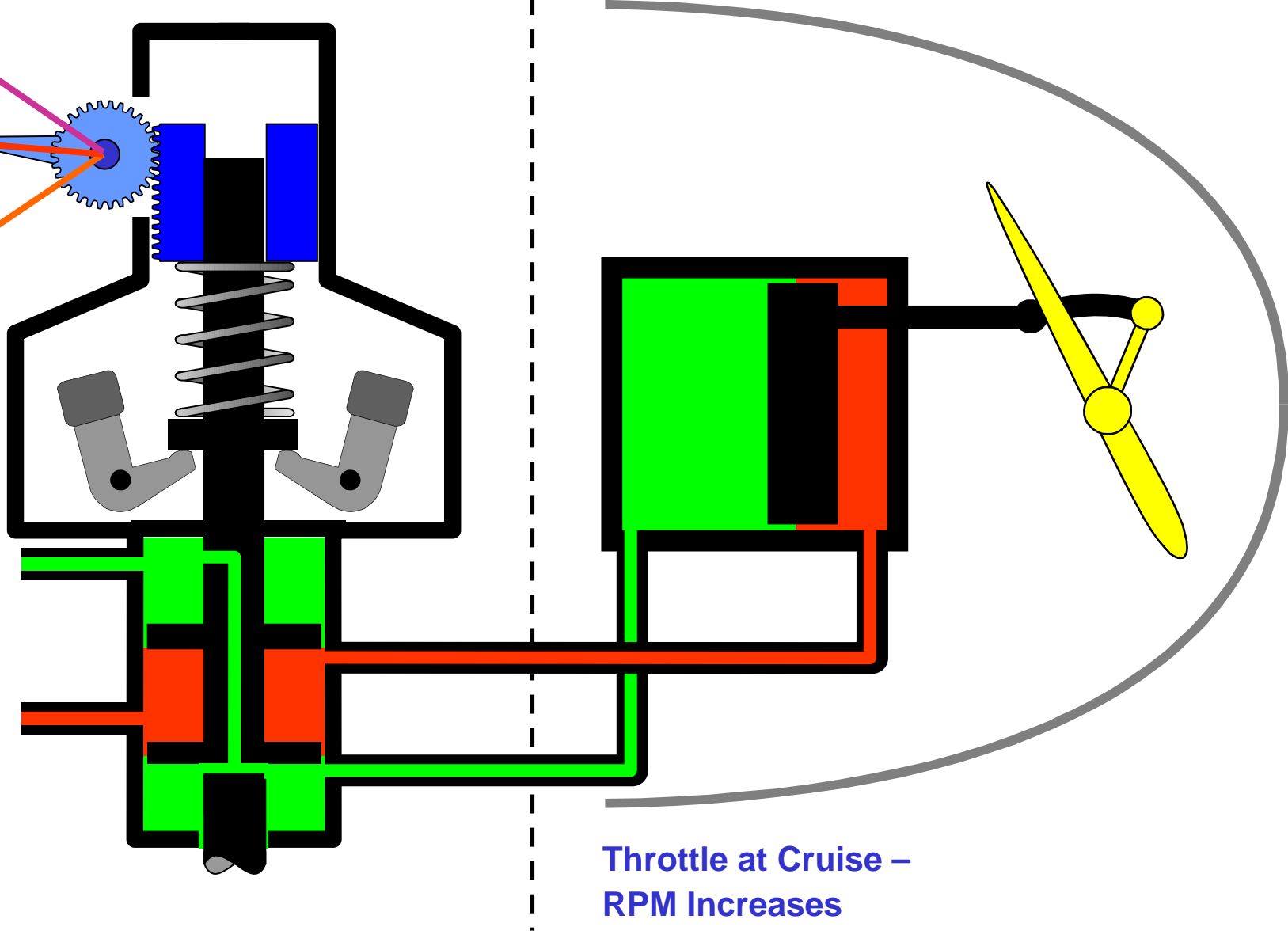
Throttle Positions

Take Off

Cruise

Start & Idle

Engine Mounted | Propeller Hub



PROPELLER SYSTEM – VARIABLE PITCH CONTROL

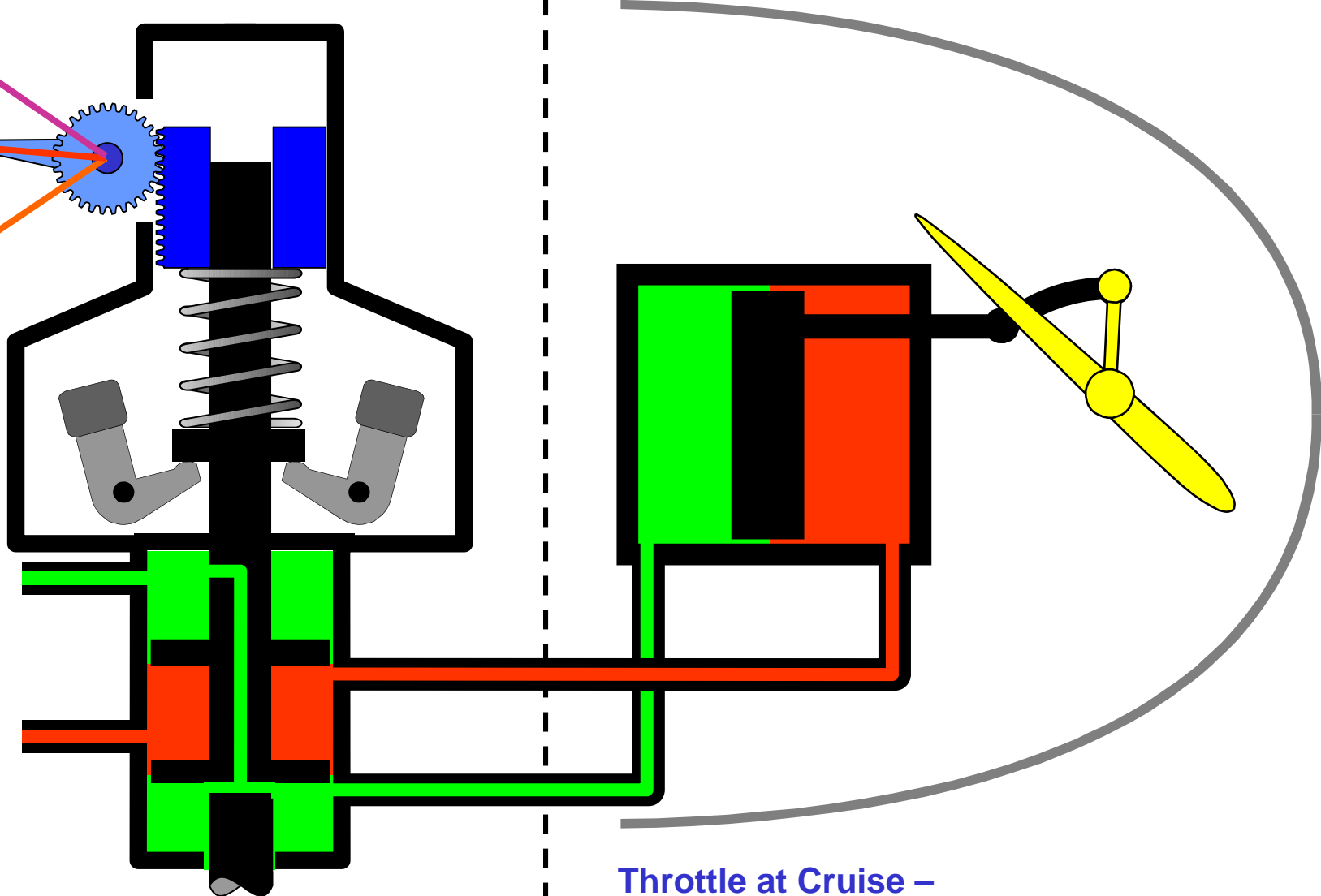
Throttle Positions

Take Off

Cruise

Start & Idle

Engine Mounted | Propeller Hub



Throttle at Cruise –
RPM Increases - Prop Goes to Coarser Pitch

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

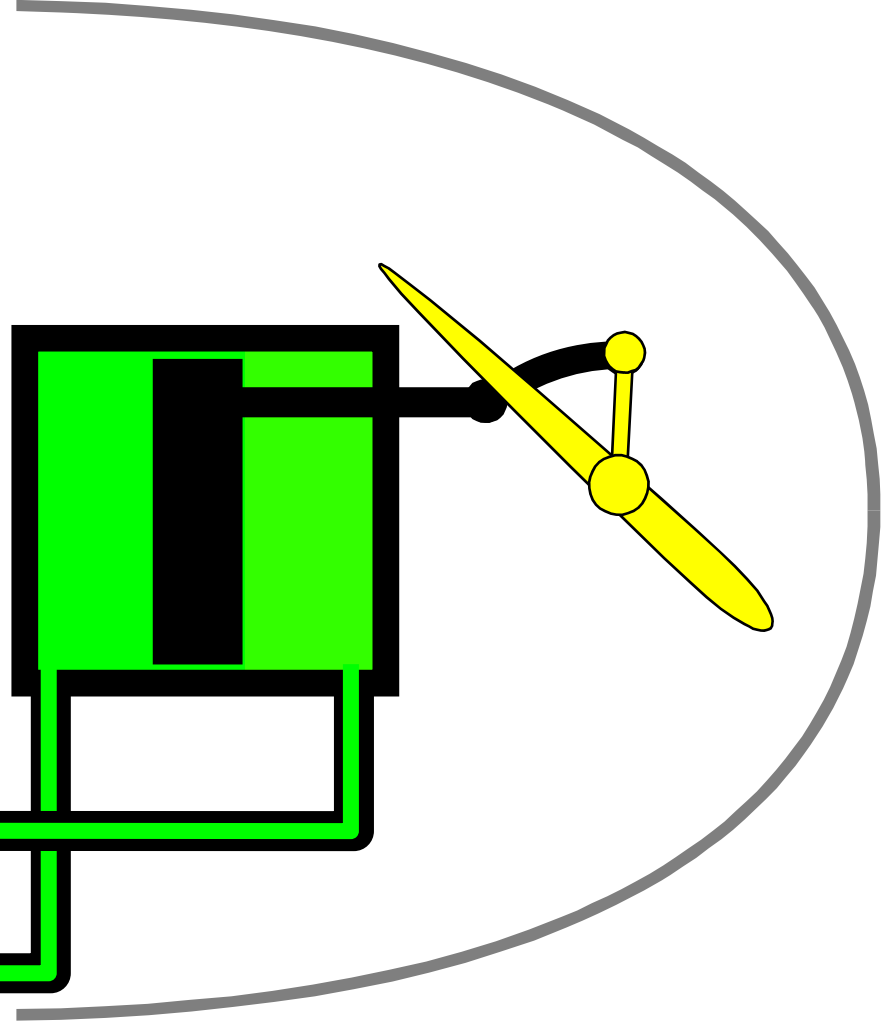
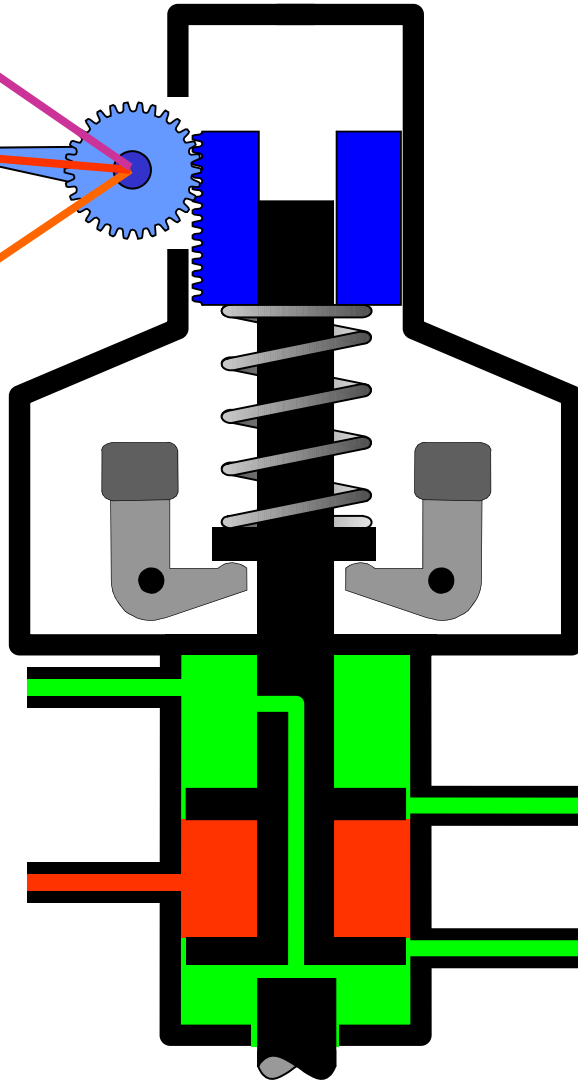
Throttle Positions

Engine Mounted | Propeller Hub

Take Off

Cruise

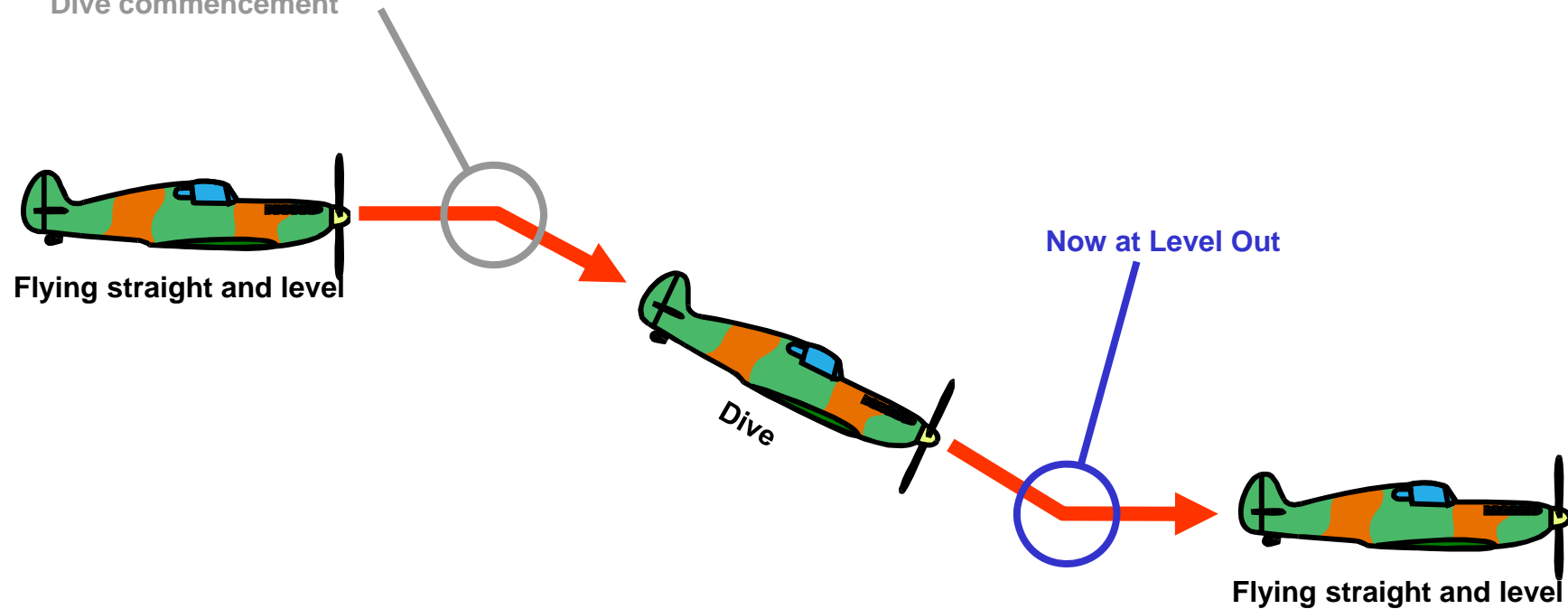
Start & Idle



Throttle at Cruise –
Aircraft in Dive – RPM Restored

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

Looked at how the PCU changes propeller pitch and maintains constant engine speeds during Dive commencement



In all these manoeuvres, all the pilot is doing is flying (redirecting) the aircraft, the throttle is not touched.

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

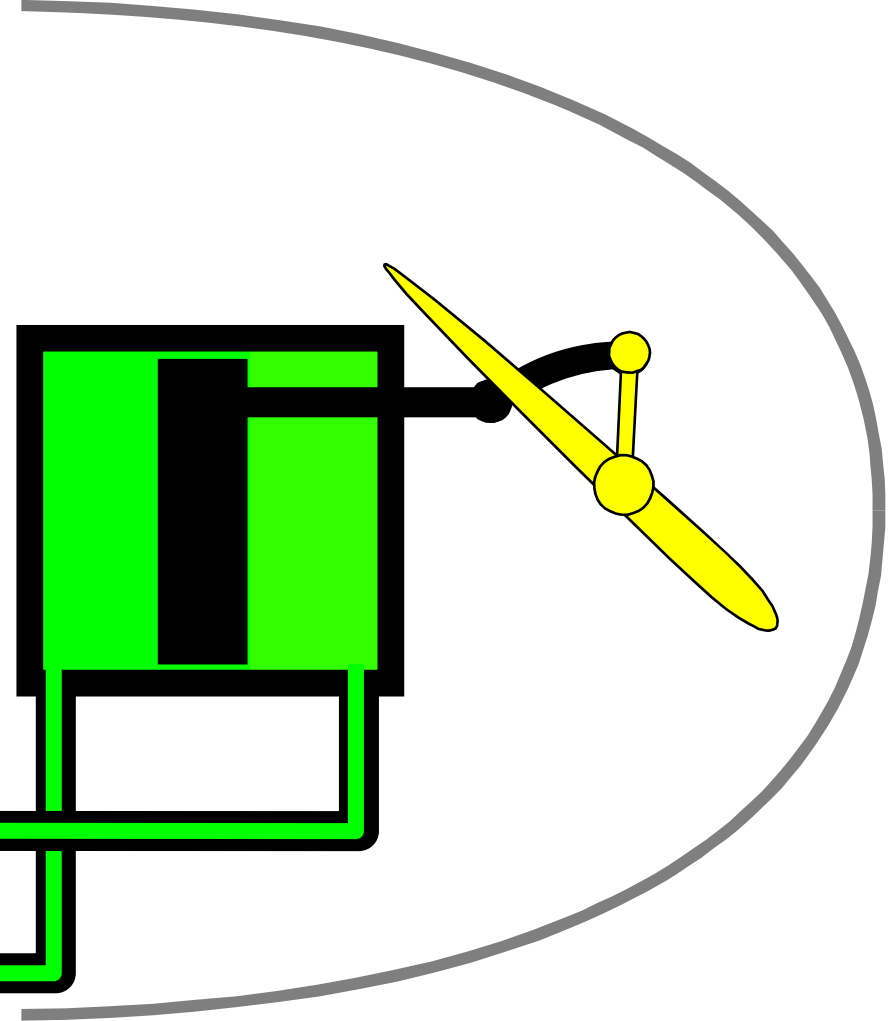
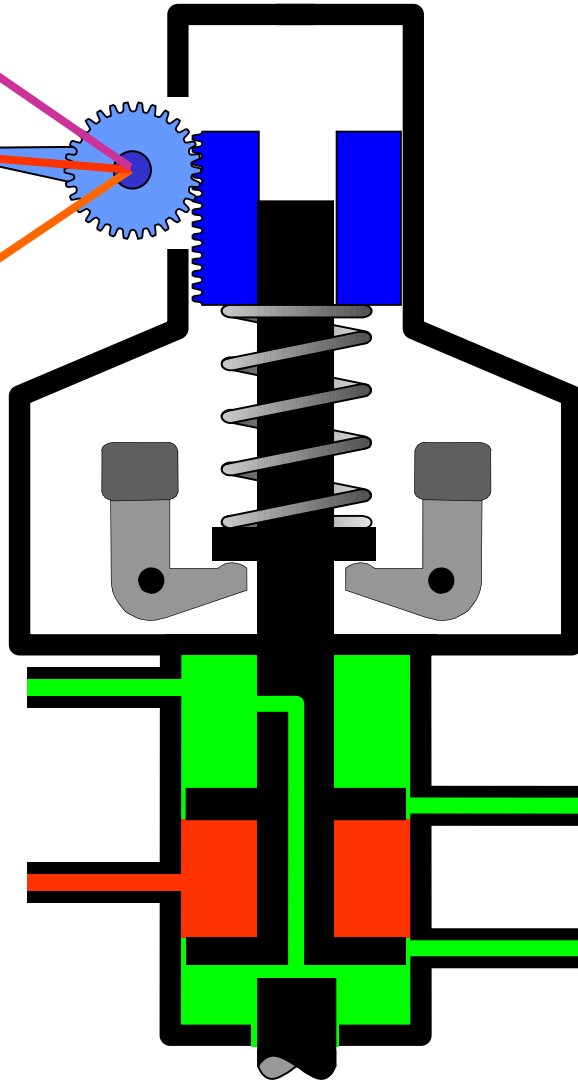
Throttle Positions

Engine Mounted | Propeller Hub

Take Off

Cruise

Start & Idle



Throttle at Cruise – Aircraft Levels Out

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

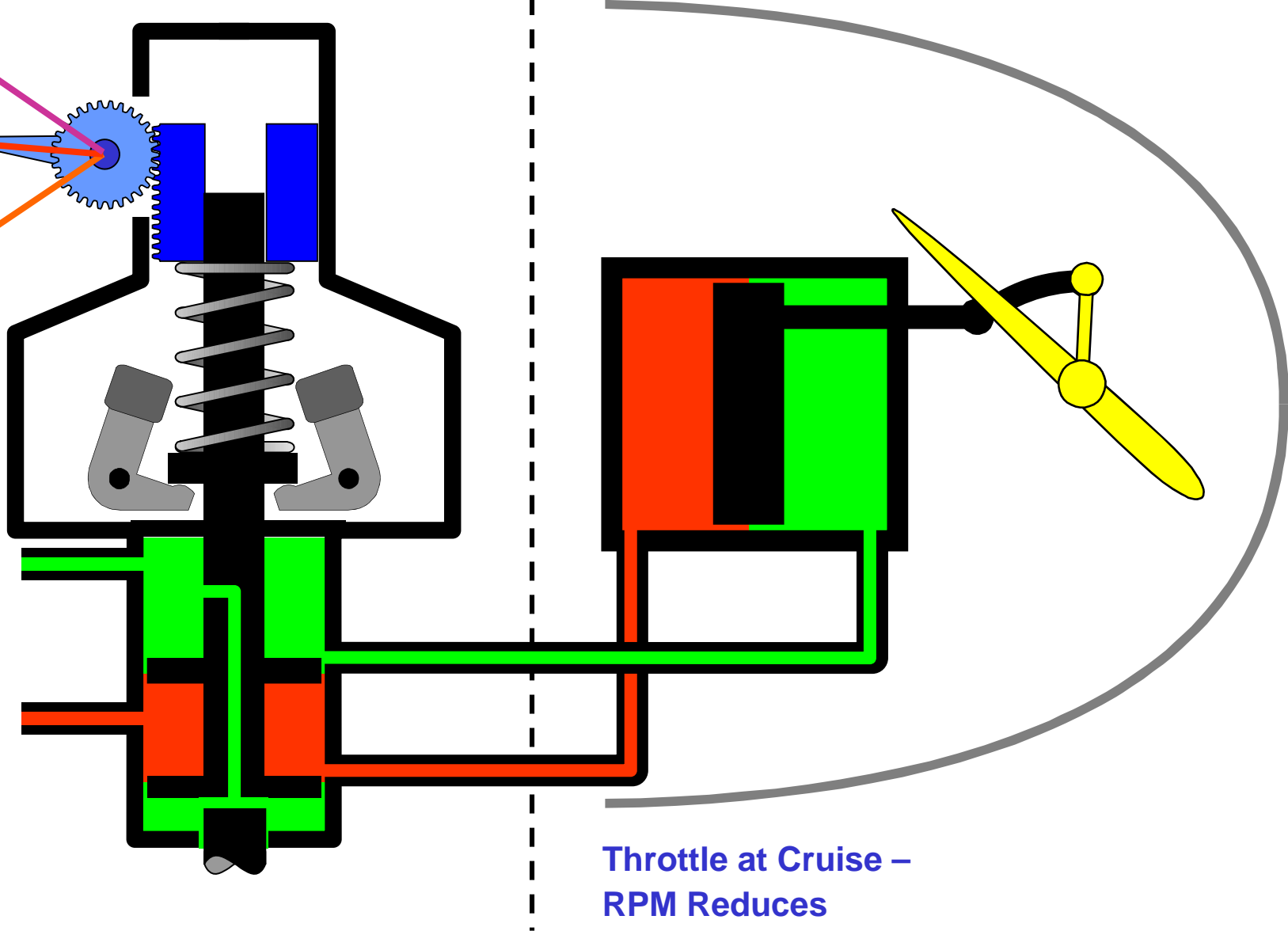
Throttle Positions

Take Off

Cruise

Start & Idle

Engine Mounted | Propeller Hub



Throttle at Cruise –
RPM Reduces

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

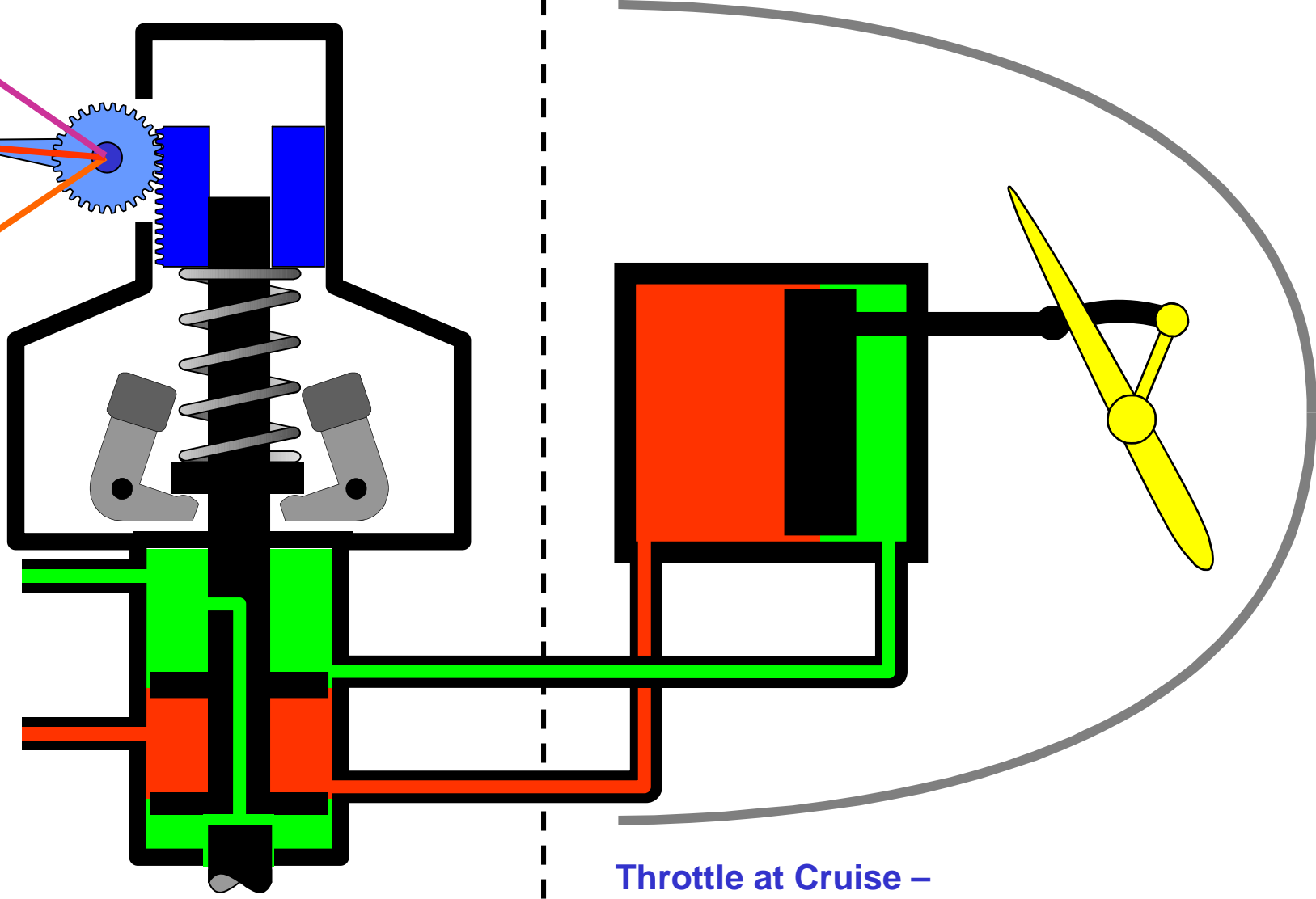
Throttle Positions

Engine Mounted | Propeller Hub

Take Off

Cruise

Start & Idle



Throttle at Cruise –
Prop Pitch Reduces

PROPELLER SYSTEM – VARIABLE PITCH CONTROL

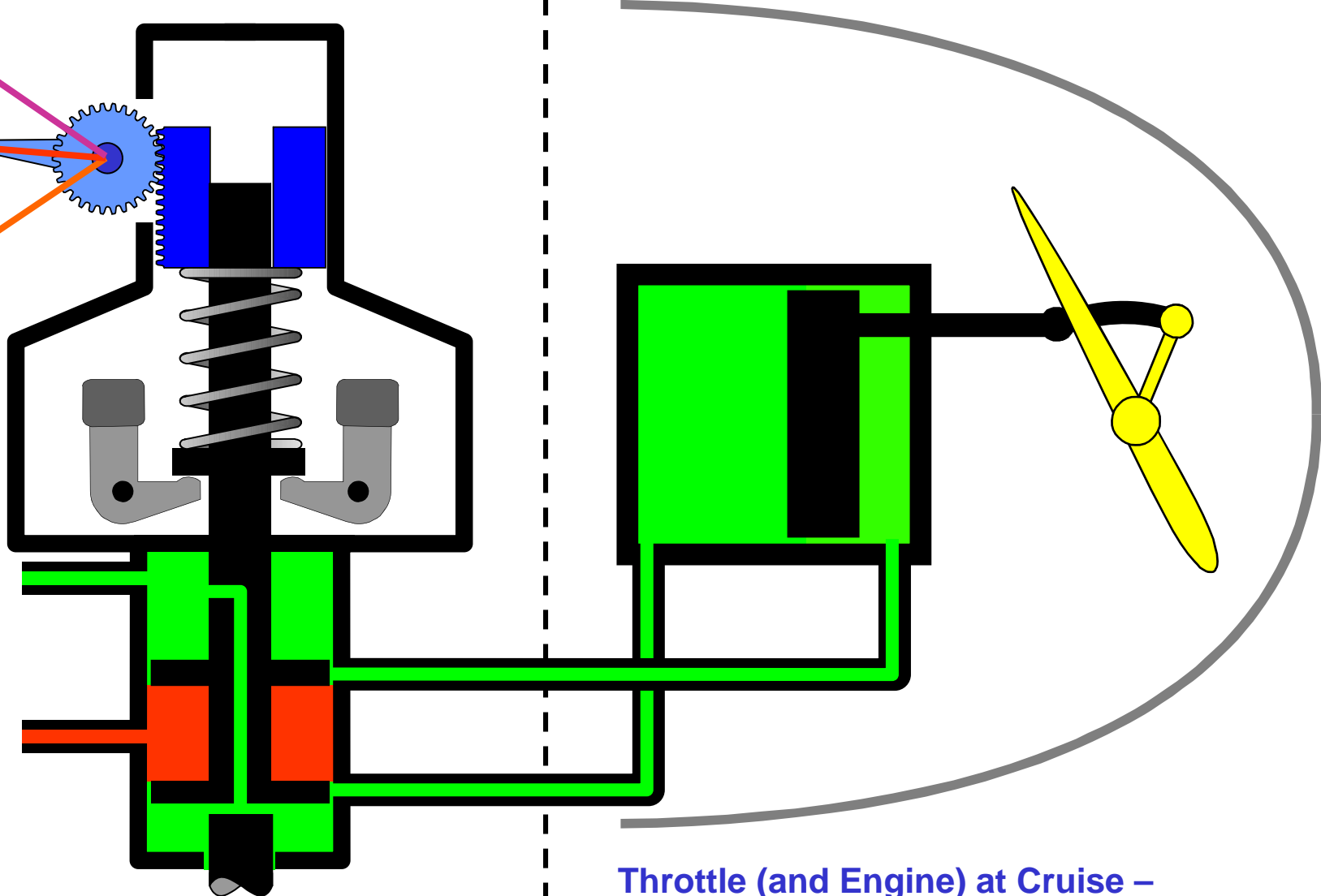
Throttle Positions

Take Off

Cruise

Start & Idle

Engine Mounted | Propeller Hub



Throttle (and Engine) at Cruise – RPM Restored

PROPELLER SYSTEM – VARIABLE PITCH CONTROL